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It depends how you look at it: On the relationship between neuroticism and conscientiousness at the within- and the between-person levels of analysis

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In Press "Journal of Research in Personality"

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Abstract

Research on personality structure has primarily focused on patterns of covariation between traits, and less emphasis has been put on the organization of relationships between thoughts, feelings and behaviors as they occur within individuals. Over several weeks 115 managers from large Australian companies were assessed multiple times a day employing experience sampling methodology. Within- and between-person variation in personality responses was analyzed using hierarchical linear modeling and correlation analyses. Findings indicate that analyzing personality as a within-person phenomenon reveals information not well captured by the trait approach. While conscientiousness and neuroticism were negatively correlated at the between-person level, this relationship was reversed at the within-person level. Results are discussed in terms of the distinctness of the within- and between-person structure of personality.

Keywords: within-person variability, conscientiousness, neuroticism, personality structure, experience sampling, organizational behavior

It Depends How You Look at it: On the Relationship Between Neuroticism and Conscientiousness at the Within- and the Between-person Levels of Analysis

The study of personality structure has long been an important topic in personality research. Much of this research has focused on between-person differences in personality traits and the patterns of covariation among these traits (e.g., McCrae & Costa, 1997). Less emphasis has been put on the organization of relationships between thoughts, feelings and behaviors as they occur within individuals (see Cervone, 2005). However, there is growing evidence that within-person variability (a) represents a large part of the total variability observed in personality responses, (b) is systematic, and, importantly, (c) coexists with between-person stability in these variables (e.g., Fleeson, 2001). In this paper we provide empirical evidence for the distinctness of the between-person and the within-person structure of personality by studying the inter-relationship between two major personality dimensions, neuroticism and conscientiousness, at both the between- and within-person levels of analysis.

This paper makes three contributions. First, it investigates whether the negative neuroticism-conscientiousness relationship observed in between-person studies is merely a description of differences between individuals, or whether it also characterizes the internal psychological structure that individuals possess. Second, by studying the co-variability of two personality dimensions over time and situations this paper draws conclusions about the structure of personality as it unfolds within individuals. This is important, as until recently there has been a strong reliance in the study of personality on between-person analyses; however, between-person analyses provide little insight into the psychological functioning of the individual (Borsboom, Mellenbergh, & Heerden, 2003). Finally, it provides evidence for the generalisability of previous findings on within-person variability in personality responses to non-

student samples, and discusses applications of a within-person approach to the study of personality in organizational settings.

Prior studies on within-person variability in personality responses (Borkenau & Ostendorf, 1998; Fleeson, 2001, 2007) have been limited to student samples in university settings, which typically allow for greater opportunity for expression of personality throughout the day than more structured work environments. It is, therefore, not clear to what extent these findings generalize to non-student samples. We study the relationship between neuroticism and conscientiousness in a sample of experienced managers operating in their natural organizational work environments, using experience-sampling methodology.

We concentrate on neuroticism and conscientiousness for three main reasons: (a) Among the personality dimensions neuroticism and conscientiousness have been shown to have the highest predictive validity in regard to work outcome variables, such as job performance, and, hence, are of high relevance in a work context (Barrick & Mount, 1991; Barrick & Mount, 2000); (b) The dimensions of neuroticism and conscientiousness refer to affective components (e.g., feeling frustrated) and work-related motivational and behavioral components (e.g., investing effort) that can be expected to vary across different situations at work; (c) Neuroticism and conscientiousness have been shown to be substantially negatively correlated at the between-person level of analysis (Mount, Barrick, Scullen & Rounds, 2005). The appropriateness of a within-person interpretation for the between-person finding – i.e. when an individual experiences greater neurotic tendencies he or she also tends to act less conscientiously – has not been tested directly.

In our approach we follow Borsboom et al.'s (2003) call for more research on the similarities and differences between the between-person and the within-person structure of psychological constructs. The implicit assumption that the statistical

relationship between traits represents the same relationship between associated states observed over time within a person needs to be tested. This is because statistically, any type of relationship at the between-person level can coexist with any type of relationship at the within-person level of analysis (Nezlek, 2001; Schmitz, 2006; Tennen & Affleck, 1996). Specifically, within a work context with accountabilities and rewards at risk high levels of negative affect (e.g., as a result of working towards deadlines) may be positively related to conscientious behaviors, such as level of effort.

In the next paragraphs we elaborate on the between-person relationship between neuroticism and conscientiousness. We discuss reasons as to why the two personality dimensions might be related, even though conceptually this is not expected. We then move on to findings at the within-person level of analysis that might give some indication about the relationship between state indicators of neuroticism and conscientiousness.

Between-Person Relationship Between Neuroticism and Conscientiousness

From a between-person perspective neuroticism and conscientiousness are strongly negatively correlated. In fact, the negative neuroticism-conscientiousness correlation is the most robust cross-domain correlation among the Big Five factors, which Mount and colleagues (2005) estimated to be -.52 when corrected for sampling error and unreliability. The empirical evidence for a strong negative relationship between the factors neuroticism and conscientiousness contradicts a conceptual assumption of the five-factor model: the orthogonality of its factors (Costa & McCrae, 1995; Goldberg, 1993a, 1993b). While, one should keep in mind that the Big Five have been "discovered" in factor analyses using orthogonal rotation techniques, non-trivial correlations between scale scores of the Big Five factors are well documented and this finding has lead to some discourse in the literature (Block, 1995; Costa &

McCrae, 1992a, 1992b, 1995; Eysenck, 1992; McCrae, Zonderman, Costa, Bond, & Paunonen, 1996; Saucier, 2002).

From a conceptual perspective, it has been argued that inherent properties of trait terms in the English lexicon lead to non-orthogonality in the data structure (Goldberg, 1993a; Peabody & Goldberg, 1989; Costa & McCrae, 1992a, 1992b; McCrae et al., 1996). Goldberg (1993a) and Hofstee, de Raad, and Goldberg (1992) have shown that English trait terms are located in clusters in a multi-factorial space – the Big Five factors – and that many trait terms represent blends of at least two (orthogonal) factors. For instance, trait terms located between the factors neuroticism (or emotional stability) and conscientiousness typically clustered at the evaluative congruent poles, i.e., were high or low in both emotional stability and conscientiousness. Another argument refers directly to the social desirability of most trait terms (Block, 1995; Costa & McCrae, 1992; Peabody & Goldberg, 1989). If neuroticism is reversed and labeled emotional stability then all Big Five factors imply desirable personality characteristics, at least in the western culture. Self-ratings of respondents who view themselves positively or who would like to be viewed positively by others (social desirability) might be inflated on all five factors. Observer-ratings, however, might not present this bias in positivity. In line with this argument Biesanz and West (2004) found that data compiled across diverse informants (self, peer, parent) produced a more orthogonal structure of Big Five traits than data from any single source of information.

From a measurement perspective, it has been argued that non-orthogonality of the Big Five factors is an unintended outcome of the Big Five scale construction process. As the Big Five factors are not equal in size, that is they differ in the number of trait terms that they subsume (Saucier, 2002; Goldberg, 1993a; Peabody & Goldberg, 1989), attempts to create instruments with scales of equal size include

sampling of items for the two smaller factors (neuroticism, openness) that are also related to some extent to the other three factors (extraversion, agreeableness, conscientiousness). This practice might explain unexpected correlations between the broad (including conscientiousness) and not so broad (including neuroticism) factors (Saucier, 2002). Finally, it has been argued that the particular selection of facets to represent the five factors in major Big Five measures contributes to "undesirable" Big Five scale inter-correlations (Costa & McCrae, 1995; McCrae et al, 1996). Support for this argument can be found in studies that have analyzed facet scales across several major Big Five instruments (e.g., NEO-PI-R, Costa & McCrae, 1994; PCI, Mount, Barrick, Laffitte, & Callans, 1999; HPI, Hogan & Hogan, 1992; AB5C-IPIP, Goldberg, 1999). Findings show that not all conscientiousness and neuroticism facets contribute equally to the shared variance between the two factors (Roberts, Chernyshenko, Stark and Goldberg, 2005; DeYoung, Quilty, and Peterson, 2007).

Digman (1997) has argued, however, that the Big Five are essentially oblique. According to his view frequently observed factor scale score inter-correlations are meaningful indicators of higher order factors in the personality structure. Based on a fairly diverse set of data in terms of the sample and the methodology used, Digman (1997) found evidence for the existence of two higher order factors, socialization and personal growth. Based on Digman's work neuroticism and conscientiousness could be interpreted as part of the same higher order construct, socialization, hence, their interrelatedness.

The evidence to date is not conclusive as to whether the between-person correlation between conscientiousness and neuroticism is, indeed, conceptually meaningful. However, if the negative correlation between the two dimensions is taken seriously, it can be assumed that individuals who tend to be more neurotic than others also tend to act less conscientiously than others in the same population.

In this paper we study whether, at the level of the individual, stronger neurotic responses are associated with less conscientious behaviors.

Within-Person Relationship Between Neuroticism and Conscientiousness

In order to study the within-person relationship between neuroticism and conscientiousness we need to conceptualize the two constructs as state variables. We assume that neurotic and conscientious thoughts, feelings and behaviors vary considerably over time and situations and that this variation is systematic (i.e., different from error).

Fleeson (2001) suggested conceptualizing personality traits as density distributions of trait-relevant behaviors or states. He explored the distribution of Big Five relevant states in students' everyday life over a period of 2 to 3 weeks employing an experience sampling approach. Within-person variability was high and comparable in its amount to the observed between-person variability in these measures (see also Fleeson, 2007). The average individual regularly reported nearly all levels in all traits. Furthermore, stable individual differences were found not just in the central tendencies (mean) of the state distributions but also in their variation (SD). Borkenau and Ostendorf (1998) reported similar findings. Students completed an adjective-based Big Five measure once per day over 90 consecutive days (Ostendorf, 1990). Most individuals showed substantial variance in their item responses, yet they differed systematically in how much they varied in their item responses over time.

Within the field of personality research evidence is limited with regard to the structure of Big Five relevant states as it unfolds within individuals. In their study Borkenau and Ostendorf (1998) compared the structure of within-person variations of Big Five marker items with the structure of between-person variations in the same items. A substantial match was found between the factor structure of correlations

between states when averaged across the 22 participants and the reference factor structure of correlations between traits as assessed in a different sample. However, for each individual participant this match was rather weak. Borkenau and Ostendorf discuss low reliability of the individual p-factor patterns as a potential source for this mismatch. Similarly, Schutte, Malouf, Segrera, Wolf, and Rodgers (2003) present findings from a confirmatory factor analysis suggesting an acceptable fit between response patterns on Big Five state and trait items. They provided participants with a state and trait version of Saucier's unipolar adjective list (Saucier, 1994; Goldberg, 1992). However, the interpretation of their findings is problematic as they based their factor analysis of state inter-correlations on data assessed at only one occasion, and so their data does not capture day-to-day variability in Big Five relevant states.

To the knowledge of the authors there are no studies that specifically looked at the neuroticism-conscientiousness relationship at the within-person level of analysis. However, support for the assumption of a positive relationship can be found in research on emotional regulation that have used repeated measurement designs. For instance, Fisher and Noble (2004) studied changes in task cognitions (e.g., effort, perceived performance) and emotions of employees in various work settings over a period of two weeks. Taking a within-person perspective in their analyses they found that, when controlling for perceived performance, effort was positively related to negative emotions, suggesting that behaving conscientiously (putting in effort) might be associated with negative affect, a main aspect of the neurotic response.

In order to draw conclusions about the neuroticism-conscientiousness relationship at the within-person level of analysis we first need to establish that there is within-person variability in the neurotic and conscientious states that individuals experience. We, therefore, hypothesize:

H1: Individuals vary in their neurotic and conscientious thoughts, feelings and behaviors over time and situations, and this variation is comparable in its amount to the variation in these states between people (within-person variability hypothesis).

We further hypothesize:

H2: The between-person relationship between neuroticism and conscientiousness is not equivalent to the within-person relationship between the two variables. Specifically, while neuroticism and conscientiousness are negatively related at the between-person level, we expect the two variables to be positively related at the within-person level of analysis (between- and within-person comparison hypothesis).

Method

Participants

The study involved 115 middle-level managers working at three large Australian companies (aged 24 to 48 years, $M = 32.4$, $SD = 5.0$, 44% female). Participants were recruited from managers participating in a leadership training program run by a major university in New South Wales, Australia. On average participants had 4.3 years of experience in management, and had worked 2 years in their current job. Sixty eight percent of the participants had completed a university degree (37% postgraduate level, 31% undergraduate level). Fifteen percent of the participants reported "high school" as their highest level of education. The remaining 17% of participants reported having completed a different degree ("other").

Measures

State neuroticism and state conscientiousness. The authors compiled a set of items assessing cognitive, affective and behavioral states that relate to the two personality

dimensions of neuroticism and conscientiousness. The seven neuroticism items tap into facets of the construct identified within the well-accepted NEO framework (e.g., Costa & McCrae, 1992), such as anxiety (*How tense are you feeling right now?; How calm are you feeling right now?),* angry hostility *(How frustrated are you feeling right now?),* depression *(How sad are you feeling right now?),* self-consciousness *(How self-conscious are you feeling right now?; How dissatisfied with yourself are you feeling right now?)* and vulnerability *(How stressed are you feeling right now?).* Similarly, the four conscientiousness items tap into NEO facets, such as competence (*How efficiently are you working on this activity?),* orderliness (*How systematically are you working on this activity?),* achievement striving *(How hard are you working on this activity?)* and self-discipline *(How focused are you on this activity*?). The measure was administered via handheld computers (HP iPAQ rx5700). Participants were instructed to have the activity that they were currently involved in in mind when responding to the items. The answer format for all items was a visual analogue scale. Participants responded to each item by using a stylus and placing a tick along a line with the polar ends labeled "not at all" to "extremely" to the respective item. This was subsequently translated into a numeric scale from 0 to 6. In addition to the 11 items participants responded to another set of items, which we do not present here as we will not analyze these in the current paper. On average, it took about 2 minutes for the participants to fill in the measure on each measurement occasion.

To analyze the underlying structure of the 11 items at the within-person level we conducted a P-factor analysis (see Borkenau & Ostendorf, 1998) of the within-person correlations. Findings suggested a two-factor solution, the first factor was defined by the seven neuroticism items (loadings: frustrated = .76, self-conscious = .57, tense = .80, calm = -.67, stressed = .79, sad = .57, self-dissatisfied = .68); the second factor was defined by the four conscientiousness items (loadings: hard

working = .74, focused = .84, efficient = .82, systematic = .79). Hence, we aggregated across the seven neuroticism items, and across the four conscientiousness items to obtain a measure of state neuroticism and state conscientiousness, respectively.

Internal consistency was high for both the neuroticism and the conscientiousness subscale (between-person: α_{Neur} = .94, α_{Consc} = .82; within-person: α_{Neur} = .79, α_{Consc} = .79). The between-person reliability estimates were calculated using each participant's mean item responses (across measurement occasions). The within-person reliability estimates were based on ipsatised item responses. That is, each participant's mean on an item (across measurement occasions) was subtracted from each of his or her ratings of that item and a single consistency coefficient was calculated using these ipsatised values. This procedure controls for between-person differences in item responses (see Fleeson, 2007).

Trait neuroticism and trait conscientiousness. Indicators for trait neuroticism and trait conscientiousness were derived from (a) the statistical aggregate of participants' state neuroticism and state conscientiousness responses across measurement occasions applying Fleeson's (2001) approach of conceptualizing traits as density distributions of related states, and by (b) using a traditional non-contextualized measure, the International Personality Item Pool (IPIP) version of the NEO inventory (Goldberg, Johnson, Eber, Hogan, Ashton, Cloninger, & Gough, 2006; online available at http://ipip.ori.org/). The IPIP version of the NEO inventory was mainly employed to check whether the modified versions of the state neuroticism and state conscientiousness scales employed in the study still refer to the constructs of neuroticism and conscientiousness.

The IPIP NEO inventory is based on the five-factor model of personality (Costa & McCrae, 1992) and contains 50 items assessing five broad dimensions of personality. These are labeled neuroticism, conscientiousness, agreeableness,

openness to experience and extraversion. Participants were instructed to describe themselves as they generally are compared to other people of the same sex and roughly the same age. The answer format for all items was a visual analogue scale. Participants responded to each statement by placing a tick along a line with the polar ends labeled "strongly disagree" to "strongly agree" to the respective statement. This was subsequently translated into a numeric scale from 0 to 100. The IPIP NEO inventory was provided via desktop computers. Reliability of this measure was high in the current sample ($\alpha_{Neur} = .87$, $\alpha_{Consc} = .87$).

Demographics. In addition, we collected demographic information including age, gender, years of experience in management, and years worked in current job for participating managers.

Design

To implement the within-person aspects of our approach we required a design that allows measurement of the individual's momentary thoughts, feelings and behaviors, and the natural variation in these states over time and situations. Hence, a field study was undertaken and an experience sampling design employed. Managers undertook the study in their typical work environment. Data was collected five times per day over a period of three weeks.

Procedure

Several months before participants took part in the field study they completed the IPIP NEO inventory and a demographic questionnaire as part of the leadership training program they undertook at a major Australian university.

About two days prior to the commencement of the field study the authors held a 30-minute introductory session to familiarize the participants with the specifics of the data collection, such as the number of data requests to be expected per day. Participants then received the handheld computers and responded to one of

the experience sampling measures with the support of the authors. The participants were asked to keep the handheld computer and to carry it with them at all times over a specified three-week period from Monday to Friday and to respond to as many data requests as possible during that time. The handheld computers were programmed in advance so that the participants received 5 signals each working day (indicated by a beep tone and a message on the display of the handheld computer). Signals were spread randomly across the day from 9am to 7pm, with the restriction that at least one hour passed between signals.

Participants were asked to respond as soon as possible (and not later than 30 minutes after the signal) to each signal by filling in the questionnaire. They reported on how they thought and felt about themselves at this point in time having their current activity in mind. As participants completed the study in their natural work environment without any research staff being present they were provided with day-to-day online support if they had any questions or concerns during the duration of the study.

The response rate was acceptable for an experience sampling study. On average, participants responded to 38 of the 75 signals (response rate: 51%). Seventy-five per cent of the participants responded to more than 26 signals (quartiles: 26; 35; 50 signals). In total 4378 responses were collected.

Data Analysis

To test Hypothesis 1, hierarchical linear modeling (HLM, Raudenbush & Bryk, 2002) of the variation of state neuroticism and state conscientiousness was carried out. Two unconditional models were calculated. In Model 1 the dependent variable was state conscientiousness. In Model 2 the dependent variable was state neuroticism. We compared within- and between-person variance components in both models with the total amount of variance observed over time in each state.

To test Hypothesis 2, the correlation (Pearson) (a) between IPIP NEO trait neuroticism and IPIP NEO trait conscientiousness and (b) between average state neuroticism and average state conscientiousness was analyzed. Furthermore, hierarchical linear modeling of the covariation of neuroticism and conscientiousness at the within-person level was carried out. A two-level hierarchical linear model (Model 3) was estimated, in which the dependent variable was state conscientiousness and the independent variable was state neuroticism. The state conscientiousness and state neuroticism scores were standardized within individuals. In this model we estimated the relationship between neuroticism and conscientiousness at the within-person level (Level 1), and modeled random effects at the between-person level (Level 2). Robust standard errors were used in analyzing the significance of the effects. This approach allows us to analyze both, covariances at the within-person level (Model 3) and covariances at the between person level (correlation analyses). At the between-person level, it permits comparing two ways of estimating trait neuroticism and trait conscientiousness, that is (a) based on statistically aggregated state conscientiousness and state neuroticism scores across measurement occasions and (b) based on traditional IPIP NEO data which require the individual to mentally aggregate across their experiences.

Results

Table 1 shows the means, standard deviations and item-intercorrelations for the study variables at the between-person level. The state neuroticism and state conscientiousness measures are significantly related to the respective IPIP NEO trait scales (r_{Neur}=.29; r_{Consc}=.24), suggesting that state and trait measures employed in this study relate to the same construct of neuroticism or conscientiousness, respectively.[1]

Insert Table 1 about here

Table 2 displays the means, standard deviations and item-intercorrelations for the state variables at the between-person level aggregated in sets of three days across the 15 study days. The central tendency and variation of state neuroticism and state conscientiousness remained relatively stable across the three-week period. The relatively high autocorrelations of state neuroticism (r=.66 to r=.75) as well as state conscientiousness (r=.56 to r=.58) indicate consistency of the state measures across time.

Insert Table 2 about here

Within-person variability hypothesis

With regard to Hypothesis 1 we estimated the proportion of the total variance observed in state neuroticism and state conscientiousness accounted for by within-person variability. About half of the variance in state neuroticism (50.4%) occurred within individuals (var_{total}=1.31, var_{within}=0.66); the major part of the variance observed in state conscientiousness (74.6%) occurred within individuals (var_{total}=1.30, var_{within}=0.97). In support of Hypothesis 1 these results suggest that the neurotic and conscientious states that individuals report vary over time and situations, and that this variation is comparable in its amount to the variation in these states between people.

Furthermore, we found that there is both within-person variability in conscientious and neurotic states and between-person stability in these variables. While individuals' day-to-day experiences of conscientious and neurotic states varied considerably across the study period, at the same time, mean differences between individuals in these variables remained relatively stable across time and situations (i.e., consistency of state conscientiousness and state neuroticism measures, see Table 2). This is in line with research on Big Five relevant states using student samples (Fleeson, 2001, 2007; Borkenau and Ostendorf, 1998).

As we were able to establish that a considerable proportion of the total variance observed in state neuroticism and state conscientiousness occurs within a person over time and situations, we can now test Hypothesis 2.

Between- and within-person comparison hypothesis

With regard to Hypothesis 2 we examined whether the between-person relationship of neuroticism and conscientiousness is equivalent to the within-person relationship between the two variables.

IPIP NEO inventory data. In order to link our results to findings from other studies that have employed decontextualized trait measures (e.g., IPIP NEO inventory), in a first step we analyzed the relationship between IPIP NEO neuroticism scores and IPIP NEO conscientiousness scores. We found a negative relationship between the two variables ($r = -.45$, $p < .001$). This is in line with findings from studies that have used major Big Five scales when studying personality at the between-person level (e.g., Mount, et al., 2005).

Experience sampling data. We then analyzed the between-person relationship between neuroticism and conscientiousness using average state neuroticism and average state conscientiousness scores as indicators for the respective traits. We,

again, found a negative relationship between neuroticism and conscientiousness at the between-person level of analysis (r = -.26, $p < .01$).

Using HLM we estimated the covariation between neuroticism and conscientiousness at the within-person level (Model 3). Prior to reporting the results, we present the equations that describe this model. Note, we standardized the conscientiousness scores and the neuroticism scores within individuals before estimating Model 3. As there was only one predictor at Level 1 (see Equation 1), the standardized regression coefficient is equal to the correlation coefficient, and hence provides an estimate of the size of the within-person effect. The Level-1 equation for Model 3 was as follows:

$$y_{ij} = \beta_{0j} + \beta_{1j}(neuroticism) + r_{ij} \quad (1)$$

where y_{ij} was the level of conscientiousness of person j on occasion i, β_{0j} was person j's mean level of conscientiousness across all occasions, β_{1j} was the regression coefficient of neuroticism on conscientiousness for person j, and r_{ij} was an error term.

The Level-2 equations were as follows:

$$\beta_{0j} = \gamma_{00} + u_{0j} \quad (2)$$

$$\beta_{1j} = \gamma_{10} + u_{1j} \quad (3)$$

where γ_{00} was the grand mean for conscientiousness across participants and occasions, u_{0j} was a random effect describing individual j's deviation from the grand mean of conscientiousness, and γ_{10} was the mean of the standardized within-person regression coefficients of neuroticism on conscientiousness, u_{1j} allowing these regression coefficients to vary between participants. U_{1j} describes individual j's deviation from the mean within-person neuroticism-conscientiousness relationship.

As expected, on the within-person level neuroticism positively predicted conscientiousness (Model 3, γ_{10} = 0.11, t = 3.88, df = 114, $p < .001$), while on the

between-person level neuroticism negatively predicted conscientiousness (average state scores: r = -.26; IPIP NEO scores: r = -.45, see Table 1). In terms of effects sizes (Cohen, 1988), the within-person effect can be considered as small (r = .11, Model 3), while the between-person effect can be considered as moderate (r = -.26, using average state scores) to large (r = -.45, using IPIP scores). These findings show that conclusions about the relationship between neuroticism and conscientiousness will differ dramatically depending on the level of analysis the investigators focus on.[2] This is the case, even though we estimated within-person covariation of conscientiousness and neuroticism based on the same data – i.e. the experience sampling data – that we used to estimate between-person covariation of these variables.[3] Therefore, we can rule out that differences between the within- and between person relationships are due to different measures used on each level of analysis. Note that measurement reliability was sufficiently high at both the between-person and the within-person level of analysis in this study.

Figure 1 depicts the neuroticism-conscientiousness relationship observed in the experience sampling data on (a) the between-person level of analysis for the entire sample (left panel) and (b) the within-person level of analysis for three selected individuals scoring low, moderate or high on the neuroticism dimension (right panel). On average the within-person relationship was positive.

Insert Figure 1 about here

While on average conscientiousness was positively related to neuroticism at the within-person level, significant differences were observed in this relationship

between individuals (Model 3, Level-2 random effect, u_{1j}: $SD = .26$, $\chi^2 = 416.47$, $df = 114$, $p < .001$). Figure 2 depicts the frequency distribution of individual regression coefficients (i.e., slopes) in the sample.

Insert Figure 2 about here

The within-person neuroticism-conscientiousness relationship varied between individuals with 68% of the sample (± 1 SD) falling between $-.15 \leq \beta_{1j} \leq .37$. For more than two thirds of the sample (72%) the within-person neuroticism-conscientiousness relationship was *not* negative (i.e., $0 \leq \beta_{1j}$).

Discussion

The aim of this paper was to test whether the negative neuroticism-conscientiousness relationship observed in between-person studies is merely a description of differences between individuals, or whether it also characterizes the internal psychological structure that individuals possess. Employing an experience sampling design we studied the variation and covariation in managers' momentary neurotic and conscientious states as they occurred during their workdays over a period of three weeks. Our results support previous research on between-person cross-domain correlations among the Big Five factors (Mount et al., 2005) and provide additional insight by adding a within-person perspective to the study of these relationships. Research on between-person differences in personality responses suggested that neuroticism would be negatively associated with conscientiousness – a finding that we replicated in our data using traditional decontextualized measures (IPIP NEO inventory) as well as contextualized or state measures. This suggests that individuals who tend to be more neurotic compared to others in the same population, also tend to be less conscientious than others in the same population. However, at the level of the individual this relationship was reversed, suggesting that when individuals experience neurotic tendencies, such as negative affect, they tend to engage in conscientious behaviors. This finding applies to individuals who operate in a demanding work environment where conscientious behaviors are typically rewarded.

Psychological research is primarily based on between-person analyses. Findings from these studies are often interpreted in terms of the psychological functioning of the individual. This is problematic, as it relies on the assumption that constructs that are identified at the between-person level directly apply to structures or processes that operate at the level of the individual (Borsboom et al, 2003).

However, this is not necessarily the case (Nezlek, 2001; Schmitz, 2006). For instance, we might assume that the between-person five-factor model of personality implies a five-factor structure that operates within individuals, causing particular thoughts, feelings and behaviors to occur within a person. This assumption is misguided (see also Cervone, 2005), unless it is demonstrated that the within-person structure of personality is qualitatively the same as the between-person structure of personality. That is to say that the dimensions on which a person varies over time and across situations, and the dimensions on which this person differs from other people at a given point in time are the same. Importantly, equivalence between the within-person structure and the between-person structure of personality cannot immediately be assumed, but needs to be investigated. Hence, until equivalence has been demonstrated the five-factor model of personality should be treated as a characteristic of the population not the individual (Borsboom et al., 2003).

The evidence suggests that the within-person structure of personality differs from the between-person structure of personality. Individual within-person factor structures of Big Five relevant states relate rather weakly to the typically observed overall between-person factor structure of Big Five traits (Borkenau & Ostendorf, 1998). The current study provides further evidence for the distinctness of the between- and within-person structure of personality in that it shows that neurotic and conscientious states are related differently on the within- as compared to the between-person level. Similarly, discrepancies between within-person and between-person structures have been demonstrated for affective experiences (Feldman, 1995; Zelenski & Larsen, 2000). Note that, Fleeson, Malanos and Achille (2002) found overlap in the between- and within-person relationship between extraversion and positive affect, though stable individual differences in the strengths of the within-

person relationship were also detected. For most relationships studied in the field of personality this information is not available in the literature.

Adopting a within-person perspective to the study of personality will allow one to go beyond simply describing differences between people to drawing conclusions about the structure and processes that operate at the level of the individual. This information will be useful, not only in terms of theory development – many psychological theories are formulated at the level of the individual – but will also have practical implications, for instance for the development of interventions for motivation and behavior change in employee training programs. For instance, instead of focusing solely on the particular levels of neuroticism people display in relation to others in the same population, organizational psychologists could study the behaviors people display when experiencing high levels of negative affect, and whether these are adaptive for a particular environment.

There is some evidence in the literature for the adaptive advantage of negative affect through its influence on information processing strategies. Negative affect has been shown to promote a more bottom-up, detail-oriented, systematic thinking style; while positive affect has been shown to facilitate a more top-down, schema-based and generative thinking style (Bless & Fiedler, 2006; Forgas & George, 2001). Accordingly, experimental research in social psychology has found negative affect, such as sadness, to reduce judgmental errors, improve eyewitness memory for complex events, and produce more effective persuasive arguments (Forgas, 2008). Negative affect states could therefore be considered adaptive when working on tasks that require systematic, bottom-up processing and the incorporation of new knowledge.

Studying within-person structural (state-state) relationships requires extensive sampling of a person's thoughts, feelings and behaviors across time and situations,

and cannot be accomplished based on a one-off assessment approach. While more laborious, this approach allows one to address important questions that have previously not received much attention, and, as part of a more integrated research program in the study of personality in organizational contexts, might lead to new and different insights, such as the beneficial effects of neuroticism in some circumstances.

Limitations

One potential limitation of the current study is that causality of the neuroticism-conscientiousness relationship was not established. However, the point of the current study was to test whether the negative neuroticism-conscientiousness relationship found based on between-person comparisons also applies to the individual; not whether neuroticism causes conscientiousness, conscientiousness causes neuroticism, or whether a third variable causes both. An alternative interpretation of the positive within-person neuroticism-conscientiousness relationship is that behaving conscientiously does not feel good. Individuals feel stressed, frustrated, tense, and self-conscious when they exert high levels of effort, work systematically towards a goal and focus intensely on a task. Some evidence for this argument could be found in the Fisher and Nobel (2004) study on task cognitions and emotions. However, as in the current study, this interpretation is based on purely correlational data. While it was not the aim of this study to establish direction of causality between neuroticism and conscientiousness, future research should provide more insight into the neuroticism-conscientiousness relationship, for example by experimentally manipulating neuroticism states (see McNiel & Fleeson, 2006) and studying its effect on conscientious behaviors.

Another limitation of the current study relates to our sampling of states. We sampled states that relate directly to the respective trait constructs. As the aim of this

study was to examine whether there is equivalence between the between- and within-person structure of personality in terms of two of the five dimensions, we had to keep the unit of analysis constant. However, it is conceivable, and has actually been discussed to some extent in the literature (e.g., Cervone, 1997, 2005), that within-person phenomena might be quite distinct in content from the between-person phenomena. For instance, in regard to the between-person construct of general intelligence it is not assumed that there is a state "general intelligence" that explains differences in trait intelligence, but rather other concepts, such as perception, working memory, and long-term memory, have been posited to explain intellectual behavior at the level of the individual (e.g., Baddeley, 1992). This is likely the case for personality variables too (Cervone, 1997); although, note that in our study we found some evidence for the two constructs, neuroticism and conscientiousness, at the within-person level employing a P-factor analysis of the within-person correlations. Nevertheless, we know little about the types of personality states that we would need to consider on the level of the individual. One way to address this problem is to conduct a state-taxonomic study (see also Borkenau & Ostendorf, 1998). Similar to the trait taxonomic-studies that have lead to the emergence of the five factor model of personality, the aim of this type of study would be to identify the major states in the English lexicon that describe psychological functioning at the level of the individual.

Footnotes

[1] While these correlations are significant they are only moderate in size. We discuss three reasons as to why this is the case: (a) There is evidence to suggest that people's ability to correctly recall and compute summaries of past experiences – as required by trait measures – is limited (e.g., Feldman Barrett & Barrett, 2001). The state measures used in this study do not rely on memory, and a need for aggregation, and, hence, are arguably more accurate measures of people's thoughts, feelings and behaviors across situations encountered in their daily lives. Hence, only moderate correlations to trait indicators can be expected. (b) Due to the field-based nature of this study the state measures included items that were relevant for a work context and responses were mainly sampled in work settings; the trait measure was broader in its scope referring to both work and non-work settings. (c) Participants completed the trait measure several months before they responded to the experience sampling or state measures, and this could also have attenuated the correlations.

[2] We also modeled individual differences in the within-person neuroticism-conscientiousness relationships as a function of the trait measures. No relationship was found between trait neuroticism and/or trait conscientiousness as indicated by the respective IPIP NEO scores and the strength of the within-person neuroticism-conscientiousness effect. However, a small negative effect (r = -.16) on the within-person relationships was found for trait conscientiousness (but not for trait neuroticism) when using the statistical aggregate of participants' state conscientiousness (or neuroticism) responses across measurement occasions. Also, no effect was found for any of the demographic variables (age, gender, years of management experience and years in current job) on the within-person neuroticism-conscientiousness relationships.

[3] Findings remained unchanged when controlled for the time of the day signals were responded to.

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Table 1: Descriptive Statistics for Study Variables at the Between-Person Level (N = 110-115)

Variables	*Mean*	*SD*	1.	2.	3.	4.	5.	6.	7.	8.
1. Age	32.42	4.95								
2. Gender[1]	.44	.50	-.23*							
3. Years of management experience	4.29	3.42	.50**	-.23*						
4. Years in current job	2.04	2.05	.39**	-.28**	.14					
5. Average state neuroticism[2]	1.47	.82	-.26**	.08	-.20*	-.13	(.94)			
6. Average state conscientiousness[2]	3.86	.60	.20*	-.13	.13	.03	-.26**	(.82)		
7. IPIP NEO neuroticism	29.78	14.66	-.13	.15	-.13	.01	.29**	-.25**	(.87)	
8. IPIP NEO conscientiousness	71.15	13.97	-.06	.06	-.05	-.14	-.05	.24**	-.45**	(.87)

Note: [1]Gender was coded: 0=male, 1=female; [2]average state neuroticism and average state conscientiousness scores represent the statistical aggregate of participants' responses across the 75 measurement occasions. **$p < .01$, *$p < .05$; Coefficients in brackets represent Cronbach's α for the respective scales

Table 2: Descriptive Statistics for State Variables at the Between-Person Level in Sets of 3 Days of the 15 Days of the Study (*N*=85-112)

Variables, days	*Mean*	*SD*	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. State neuroticism, 1-3	1.49	.90									
2. State conscientiousness, 1-3	3.86	.70	-.13								
3. State neuroticism, 4-6	1.43	.93	.75**	-.18							
4. State conscientiousness, 4-6	3.80	.80	-.04	.58**	.02						
5. State neuroticism, 7-9	1.55	.99	.66**	-.09	.67**	-.10					
6. State conscientiousness, 7-9	3.90	.71	-.17	.57**	-.11	.66**	-.29**				
7. State neuroticism, 10-12	1.57	.98	.66**	-.14	.67**	.15	.78**	-.24*			
8. State conscientiousness, 10-12	3.93	.74	-.27**	.56**	-.20	.61**	-.23*	.64**	-.27**		
9. State neuroticism, 13-15	1.49	.95	.73**	-.13	.71**	-.27*	.82**	-.30**	.85**	-.28**	
10. State conscientiousness, 13-15	3.86	.85	-.32**	.58**	-.31**	.47**	-.28*	.56**	-.32**	.58**	-.30**

Note: $^{**}p < .01$, $^{*}p < .05$

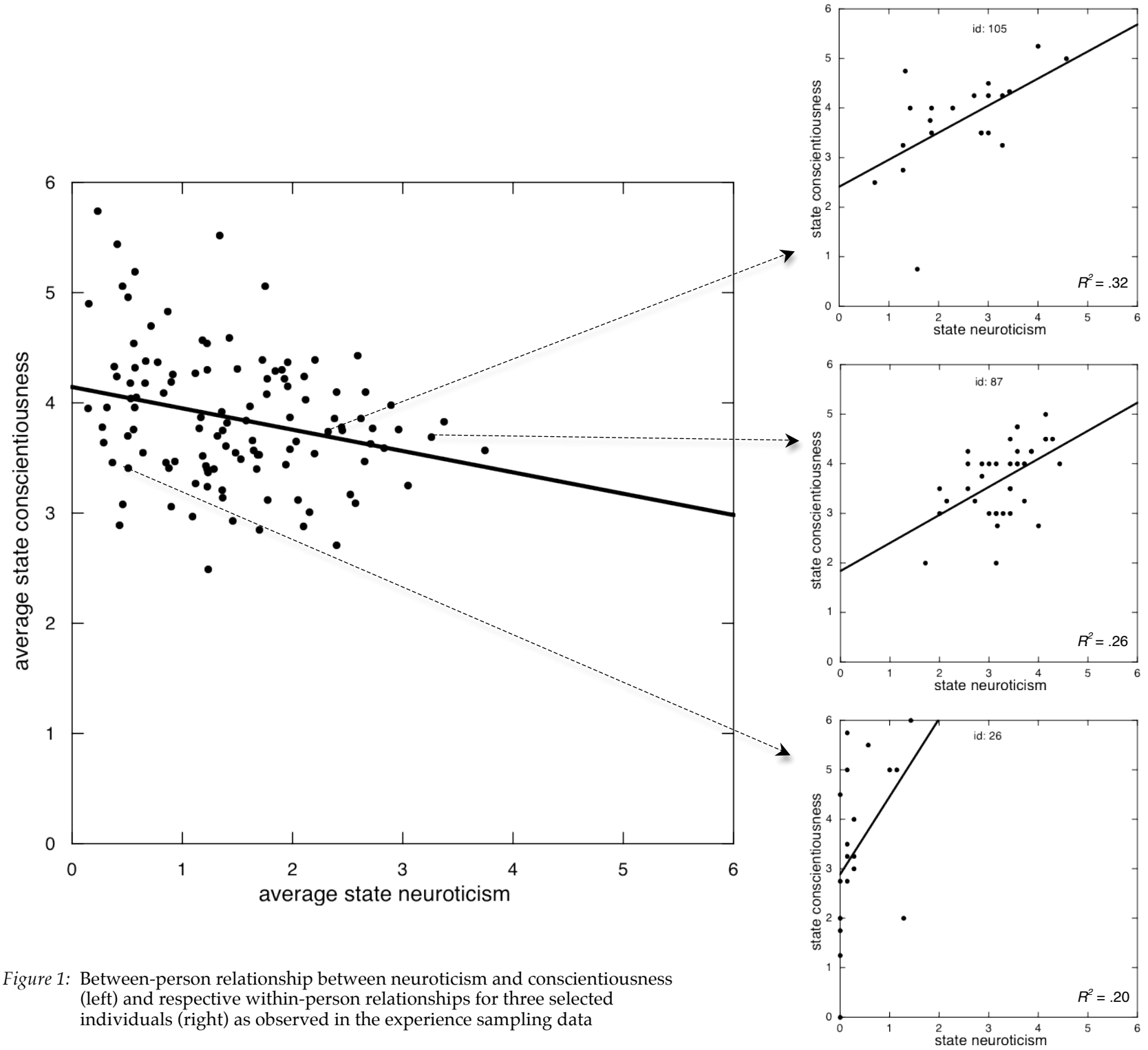

Figure 1: Between-person relationship between neuroticism and conscientiousness (left) and respective within-person relationships for three selected individuals (right) as observed in the experience sampling data

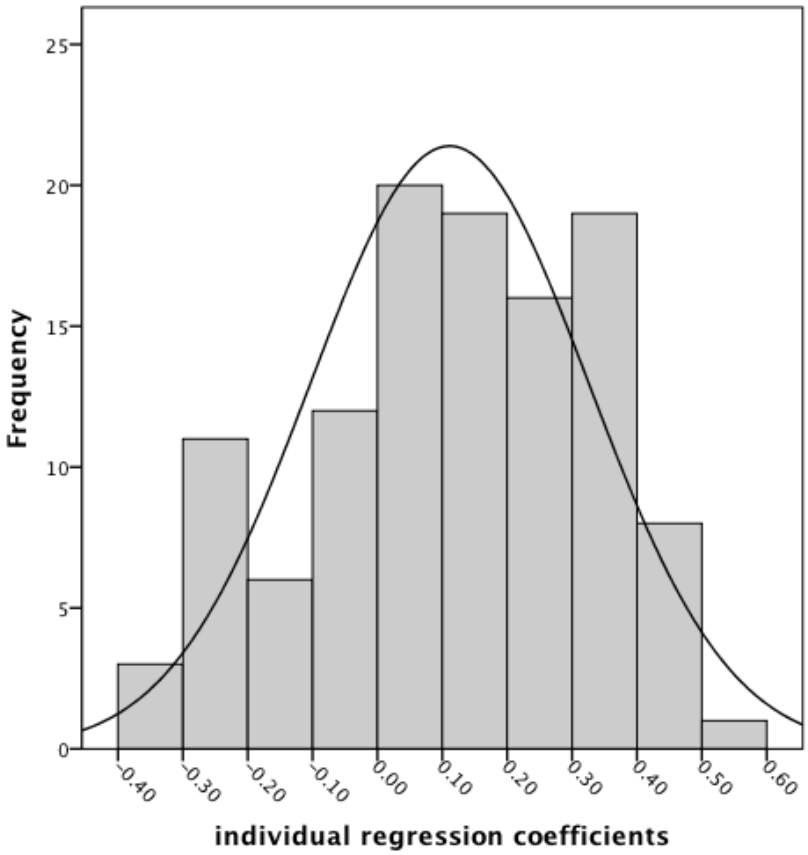

Figure 2: Frequency distribution of individual regression coefficients (M=.11, SD=.26, N=115)